APPENDIX B.8 WHITEWATER-EAST FORK WHITE SERVICE AREA
ELEMENT 1. SERVICE AREA DESCRIPTION

The Whitewater-East Fork White Service Area (SA) is located in southeastern Indiana and is composed of all or portions of the following seven 8-digit HUC watersheds:

- 05120204 - Driftwood
- 05120205 - Flatrock-Haw
- 05120206 - Upper East Fork White
- 05120207 - Muscatatuck
- 05080001 - Upper Great Miami
- 05080003 - Whitewater
- 05080002 - Lower Great Miami

The Whitewater-East Fork White SA includes all or portions of twenty-three Indiana counties listed below and is located within the Central Till Plain and Southern Hills and Lowlands physiographic regions.

Madison	Rush	Brown
Randolph	Fayette	Jackson
Henry	Union	Jennings
Wayne	Franklin	Jefferson
Hancock	Dearborn	Scott
Marion	Ripley	Washington
Johnson	Decatur	Clark
Shelby	Bartholomew	

The Whitewater-East Fork White SA drains approximately 5,139 square miles of southeastern Indiana and is primarily located in the Eastern Corn Belt Plains ecoregion and its various sub-regions; these regions include the Loamy, High Lime Till Plains in the northwest, the Whitewater Interlobate Area in the northeast, and the Pre-Wisconsin Drift Plains in the south. Glaciers from the Wisconsin Stage over 50,000 years ago formed the northern portion of the Whitewater-East Fork White SA; the soils were developed from loamy, limy glacial deposits. The northeastern portion of the SA is defined by its

coarse-bottomed streams fed by an abundance of groundwater and is where the Whitewater River flows. The southern portion of the Whitewater-East Fork White SA is characterized by acidic and extremely leached till and scattered sinkhole areas; prior to a majority of the land being converted to agriculture, beech forests and elm-ash swamp forests dominated the region. The remainder of the eastern portion of the Whitewater-East Fork White SA along the Indiana/Ohio border is part of the Interior Plateau ecoregion and Bluegrass natural region and is characterized by mosaic forests and its rugged terrain underlain by limestone and shale; this region has been extremely dissected by valleys and hills (U.S. EPA: Ecoregions of Indiana).

The Whitewater River is a significant river which flows through the Whitewater-East Fork White SA and is a main tributary of the Big Miami River of Ohio which drains into the Ohio River. The Whitewater River originates as two forks in Randolph and Wayne Counties in Indiana, flowing south toward Ohio and eventually converging in Franklin County; it is known for its steep gradient, falling at an average of six feet per mile (IDNR Outdoor Recreation, 2016).

Based on the 2011 NLCD, the land cover type with the most area in the Whitewater-East Fork White SA is agricultural land use (64.1%), followed by forest and scrub/shrub (25.3%), developed and impervious land use (8.64%), and wetlands and open water (0.89%) (Homer, et al., 2015). Per the NWI, woody wetlands are the prominent wetland type covering approximately 2.69% of the SA, while emergent herbaceous wetlands cover 0.26%.

ELEMENT 2. THREATS TO AQUATIC RESOURCES

Aquatic resource threats specific to the Whitewater-East Fork White SA have been identified using the same approach as the statewide portion of the CPF. The threats are presented in the order of the current predominance within the SA.

2.1 Section 404 Permitted Impacts

The Corps Section 404 permit data for impacts that required mitigation in the Whitewater-East Fork White SA from 2009 – 2015 was collected and analyzed **(Table 82)**. According to the data, 32.4 acres of impacted wetlands and 21,342 linear feet of impacted streams required mitigation in the seven year time period. Locations of the permitted stream and wetland impacts are provided in **Figure 96**.

Work Type Category	Authorized Stream Impacts – Linear Feet	Percent of Stream Impact per Category	Authorized Wetland Impacts - Acres	Percent of Wetland Impact per Category
Agriculture	0	0.00%	0	0.00%
Dam	546	2.56%	0.373	1.15%
Development	5,024	23.54%	7.025	21.68%
Energy Production	0	0.00%	0	0.00%
Transportation	15,772	73.90%	25.001	77.17%
Grand Total	**21,342**	**100.00%**	**32.399**	**100.00%**

Table 82. Authorized 404 stream and wetland impacts requiring mitigation by work type category, 2009 – 2015

Source: USACE Louisville District

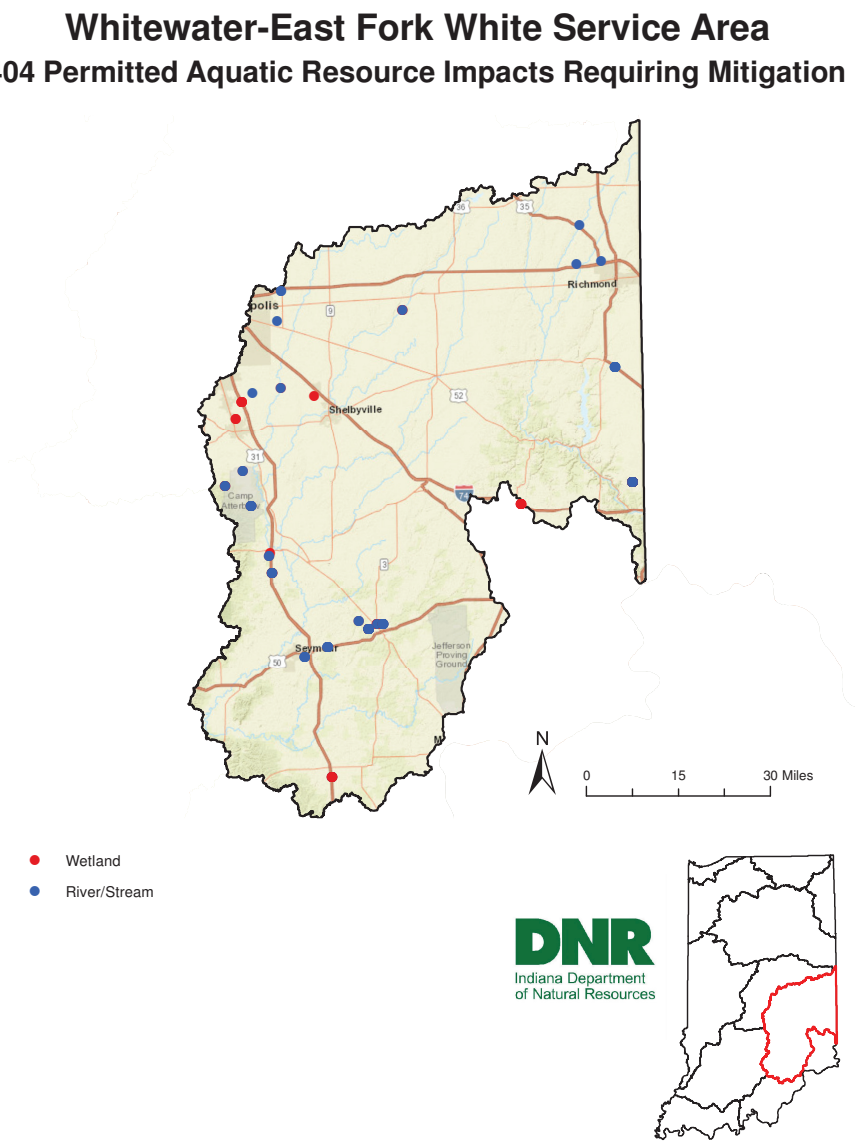

Figure 96. 404 permitted stream and wetland impacts requiring mitigation 20019- 2015

2.2 Land Cover and Land Use

In addition to 404 permitted work type categories, IDNR utilized the 2011 NLCD to identify land cover and land uses that contribute to aquatic resource and habitat impacts. Overall land cover within the Whitewater-EF White SA is presented in **Figure 97,** and displays the geographical relationship of converted cover types relative to naturally occurring cover types.

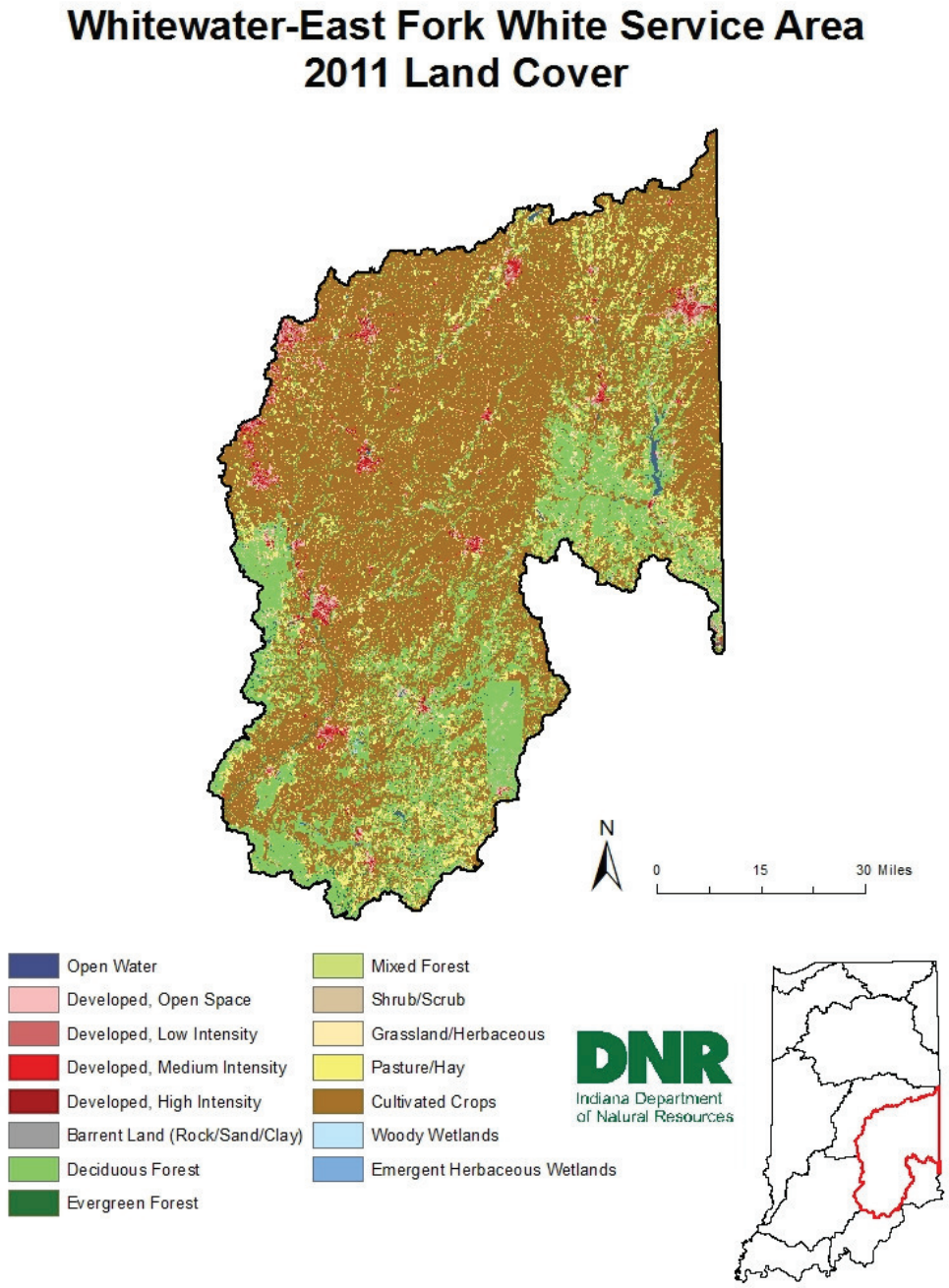

Figure 97. Land cover within the Upper Wabash Service Area from the 2011 NLCD (Homer, et al., 2015)

The land uses identified within the 2011 NLCD include multiple classes of cover, and some have additional values within specific classes based on variants or intensities within the classification **(Table 83)**.

Land Cover			
Class	**Value**	**Sum of Acres**	**Percent of Total Acres**
Open Water	*	24,345	0.74%
Developed	Open Space	186,649	5.68%
Developed	Low Intensity	65,317	1.99%
Developed	Medium Intensity	23,395	0.71%
Developed	High Intensity	8,528	0.26%
Barren Land (Rock/Sand Clay)	*	1,140	0.03%
Forest	Deciduous	813,990	24.75%
Forest	Evergreen	11,422	0.35%
Forest	Mixed	1,327	0.04%
Shrub/Scrub	*	5,364	0.16%
Grassland/Herbaceous	*	35,064	1.07%
Pasture/Hay (Agriculture)	*	233,470	7.10%
Cultivated Crops (Agriculture)	*	1,873,985	56.98%
Wetlands	Woody	2,680	0.08%
Wetlands	Emergent Herbaceous	2,197	0.07%
Grand Total		**3,288,871**	**100.00%**

Table 83. Whitewater-EF White SA land cover classification/value percentages from 2011 National Land Cover Database
*** Class does not have additional values. (Homer, et al., 2015)**

IDNR combined the values within the same land cover classification in **Figure 97** below to demonstrate the current overall land cover distribution of the SA.

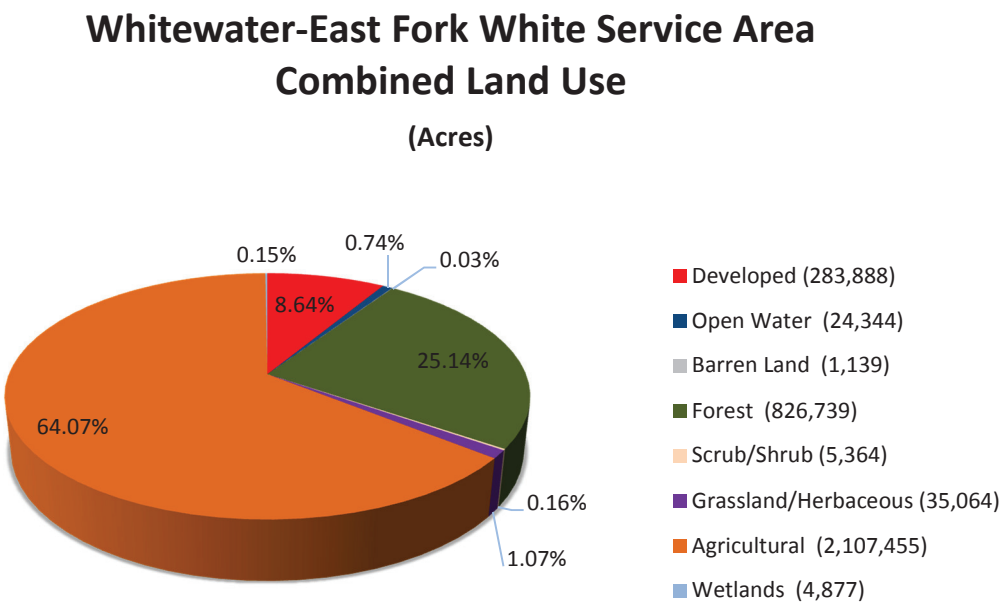

Figure 97. Combined land uses within the Whitewater-East Fork White Service Area from the 2011 NLCD (Homer, et al., 2015)

2.3 Agricultural Land Use

Agricultural land use is the largest land use in the Whitewater-East Fork White SA. Total agricultural land use covers approximately 64% of the SA's total land area of 2,107,455 acres (Homer, et al., 2015). Agricultural land uses occur throughout the SA, with the exception of the distribution of few developed areas.

Within the identified land use areas, cultivated crops cover 1,873,985 acres (56.98%) and pasture/hay lands cover 233,469 acres (7.1%) of the SA (Homer, et al., 2015). Corn production is the primary cultivated crop when based on USDA 2015 harvested crop production survey data from counties that comprise the majority of the Upper Wabash SA (United States Department of Agriculture, 2016 and 2017).

Pasture/hay lands support livestock production for small to major livestock farming operations throughout the Whitewater East Fork-White SA. Both pig and chicken farming have active confined feeding operations (CFOs) that have a minimum of 5,000 animal units. These CFOs are considered the predominant livestock industry in the SA (Thompson, 2008). When combining these major agricultural land use activities, the Whitewater East Fork-White SA ranks third in percentage of total statewide land use (9.11%), and it's a significant land use within the SA.

2.4 Growth and Development

Developed impervious land use is the third largest land use after forested, covering 283,889 acres (8.6%) of the 3,288,871 total acres which places it tied for the seventh for developed area based upon percentage across SA's. In addition to the areas adjacent to Indianapolis, the majority of developed areas are communities along the interstates of I-70, I-74 and I-65. These areas with densely developed footprints include the communities of Greenfield, New Castle, Richmond, Connersville, Franklin, Columbus, Greensburg, Shelbyville, Seymour and Lawrenceburg.

The SA contains portions of the Indianapolis-Carmel-Anderson, Columbus, Cincinnati and Louisville-Jefferson County MSA's, all of which experienced growth in the previous decade (Manns, 2013). Approximately 22% (607,621 acres) of the Indianapolis-Carmel-Anderson MSA is located within the SA, consisting of portions of Madison, Hancock, Marion, Johnson and Brown counties, and the entirety of Shelby County, accounting for approximately 18.5% of the total SA acres.

Approximately 16.5% (180,250 acres) of the Louisville-Jefferson County MSA within Indiana is located within the SA which includes portions of Scott, Washington and Clark Counties and accounts for approximately 5.5% of the total SA acres. Approximately 138,577 acres of the Cincinnati MSA, which includes all of Union County and 17% of Dearborn County, are within the SA accounting for 4.2% of the SA with the remainder of the MSA located in Ohio and Kentucky. Analysis of the INDOT cities and towns GIS data shows the Whitewater-EF White SA contains entirely or in part 324 cities and/or towns, 74 of which are incorporated (INDOT, 2016).

Five Indiana regional councils that overlap with the SA include the Southeastern Indiana Regional Planning Commission (SIRPC) (38%), the Eastern Indiana Regional Planning Commission (EIRPC) (25%), the East Central Indiana Regional Planning District (ECIRPD) (6%), the River Hills Economic Development District and Regional Planning Commission (5%), and the Madison County Council of Governments (.13%) (IARC, 2017).

According to the SIRPC 2015 CEDS, manufacturing and government institutions are the largest employers throughout the region, as well as significant employment in health care and the retail/wholesale trade. The current top commercial and industrial concentrations in the region include advanced materials, agribusiness, food processing and technology, chemicals and chemical based production, glass and ceramics, forest and wood products, mining, and fabricated metal product manufacturing in addition to transportation and logistics support. Emerging industries in the region include apparel and textiles, biomedical/biotech, energy (fossil and renewable fuels), information technology and telecommunications, and electrical equipment, appliance and component manufacturing (SIRPC, 2015).

Additionally, analysis of INDOT's local roads GIS data (INDOT Road Inventory Section, 2016) shows there are approximately 11,786 miles of municipal and county roads contributing to the developed impervious land cover within the SA. The Whitewater-EF White SA ranks eighth among SA's in local road miles to square mile of SA at approximately 2.29 miles of local roads per square mile.

2.5 Transportation and Service Corridors

2.5.1 Roads

Whitewater-East Fork White SA contains approximately 2,701 miles of U.S. Interstates and highways, 2,304 miles of state highways, and 11,786 miles of local roads within its boundary (INDOT Road Inventory Section, 2016). Although this is the third largest SA, the concentration of the various road types per square mile of land have similar rankings throughout.

U.S. Interstates and highways have a concentration of approximately 0.53 mile per square mile which ranks fifth among the eleven SAs making this the highest ranking road type within the SA. Although the concentration of U.S. Interstates and highways has the highest rank in the SA, the concentration of the other road types have identical rankings, which fall in the lower spectrum of the rankings. The concentration of state highways is approximately 0.45 mile per square mile and local roads is approximately 2.29 miles per square mile, which ranks them both at eighth. Similarly, the combined ranking of the concentration for all roadways, ranks eighth, with a concentration of 3.27 miles per square mile.

Although the concentration of U.S. Interstates and highways rank near the middle, closer analysis reveals the concentration of the various road types rank eighth, putting them near the bottom when compared to all other SAs. The construction and maintenance of roads and bridges throughout the

Whitewater-East Fork White SA support the primary mode of transportation and play an integral role in sustaining business and commerce for the region.

2.5.2 Railroads

As an alternative mode of transportation, the Whitewater-East Fork White SA has approximately 852 miles of railroad within the SA boundary which is the tenth largest concentration of railroads with a density of 0.17 mile per square mile (Federal Railroad Administration, 2002). Although active railroads rank near the bottom, they provide an important means of transportation for freight and passengers throughout the SA and state. The concentration of linear infrastructure throughout the SA has resulted in the loss of aquatic resource functions and services due to habitat conversion, disruption to fluvial processes, resource degradation, fragmentation, and loss associated with their construction and maintenance.

2.5.3 Service Corridors

Similar to threats associated with roads and railroads, the Whitewater-East Fork White SA contains service corridors that result in aquatic resource impacts and habitat loss associated with linear infrastructure. The SA contains over 2,310 miles of service corridors within its boundary.

The Whitewater-East Fork White SA contains an extensive network of large kilovolt (kV) electric transmission lines within its boundary. The large kV transmission lines identified within the SA include approximately five (12 kV) lines, sixty-three (34.5 kV) lines, 297 (69 kV) lines, 121 (138 kV) lines, fifty-five (230 kV) lines, fifty-six (345 kV) lines, and eleven (765 kV) lines (Indiana Geological Survey, 2001). These lines extend over 2,035 miles throughout the SA, which is the sixth highest concentration of electric transmission lines relative to the SA size, with 0.4 mile of transmission line per square mile.

In addition to electric transmission lines, the Whitewater-East Fork White SA contains over 275 miles of pipelines in total. It contains over 79 miles of pipelines that convey crude oil, 79 miles of pipelines that transport natural gas, and 117 miles of pipelines that deliver refined petroleum products (Indiana Geological Survey, 2002). When compared to the other SAs throughout the state, the Whitewater-East Fork White SA contains the eighth greatest concentration of crude oil pipelines, eleventh greatest concentration of natural gas and the ninth greatest concentration of refined petroleum products pipelines. While the Whitewater-East Fork White SA is third largest SA, it ranks near the bottom for the concentration of miles of these types of pipelines.

2.6 Dams and Non-Levee Embankments

There are currently 34 known low head dams (IDNR DOW, 2016) within the SA, the most among all SAs and the fourth highest concentration at one low head dam per 151 square miles. There are currently 192 state regulated high head dams (IDNR DOW, 2016) documented within the SA at a density of one

dam per 27 square miles, the third highest concentration of all SAs which accounts for 22% of all documented high head dams statewide.

Per the NLE GIS analysis (IDNR, 2016), there are approximately 591,360 linear feet (112 miles) of NLE's mapped within the SA averaging one mile of NLE per 46 square miles, the seventh highest concentration among all SA's. Approximately 56 miles of the NLE's are located within predominantly developed areas, with the remaining 56 miles mapped in rural agricultural settings.

2.7 Energy Production and Mining

2.7.1 Natural Gas and Oil Production

The Whitewater-East Fork White SA contains active gas fields and associated wells that support, or have supported, the petroleum industry. The Indiana Geological Survey (IGS) identifies 25 petroleum gas fields with 1,428 associated gas wells and one oil & gas field within the SA ranking the Whitewater-East Fork White SA fourth statewide for active natural gas and oil fields (Indiana Geological Survey , 2015).

The Whitewater-East Fork White SA also contains a series of wells that are supplemental or associated with petroleum industry that are identified within the IGS statewide well dataset. The IGS petroleum well data identifies 2,045 abandoned gas wells, 12 abandoned oil wells, 27 abandoned gas storage wells, 625 dry wells, 67 stratigraphic wells, 34 as storage wells, two temporarily abandoned wells, and one non-potable water supply wells within the SA (Indiana Geological Survey, 2015).

2.7.2 Mineral Mining and Aggregates

The Whitewater-East Fork White SA contains active mineral mining operations that extract and produce aggregate commodities. Based on the Indiana Geological Survey (IGS) 2016 active Indiana industrial mineral production data, the SA contains 15 sand & gravel mining operations, three dimension limestone operations and 14 crushed stone operations (Indiana Geological Survey, 2016). The Whitewater-East Fork White SA aggregate and mineral mining sites ranks the SA fifth in the state with 32 active operations.

2.7.3 Coal

The Whitewater-East Fork White SA does not have recoverable coal reserves and contains no active surface or underground coal mines.

2.8 Indiana State Wildlife Action Plan (SWAP) Identified Threats

The Whitewater-EF White SA contains both the Indiana SWAP Corn Belt Planning Region (63.5%) as well as the Drift Plans Planning Region (36.5%). The SWAP identifies the most significant threats to habitats and SGCN overlapping these planning regions as:

- Habitat conversion, fragmentation and loss
- Natural systems modification
- Invasive species
- Dams
- Fish passage
- Point and non-point source pollution
- Water management and use
- Housing and urban areas
- Commercial and industrial areas
- Agriculture, aquaculture, livestock
- Roads and service corridors
- Changing frequency, duration, and intensity of drought and floods

These SWAP planning regions have experienced loss in the majority of habitat types over the last decade, mostly to urban development (SWAP, 2015).

2.9 Anticipated Threats

The existing land uses with the agricultural and developed impervious footprints make up approximately 73% of the land use within the SA and are expected to remain as the top contributors to aquatic resource impairments.

IDNR expects transportation and service corridors, as well as development projects, to remain the foremost permitted activities requiring mitigation for aquatic resource impacts if the 404 permitting trends of the past 7 years continue.

According to the 2015 SIRPC CEDS, projected growth centers within the SIRPC area include the major highways such as the I-74 business corridor between Cincinnati and Indianapolis, US 50 east of North Vernon and US 62 east and west of Madison in Jefferson County. The Ohio River is expected to remain a significant component of the region as it provides transportation for commerce, creating accessibility and development in the area. Only ten cities within the SIRPC meet the U.S. Census Bureau urban community criteria (population greater than 2,500): Aurora, Batesville, Brookville, Greendale, Greensburg, Hanover, Lawrenceburg, Madison, Norther Vernon and Shelbyville. These cities are most likely to remain the growth centers within the region. This region is projected to see continued moderate population growth over the next 15 years with Dearborn County growing the most (SIRPC, 2015).

Though the number of farms and farmers in the region is in decline, agriculture remains as a significant contributor to employment and the tax base. In addition, the agricultural sector is critical for ethanol, soy diesel, food products and feed materials in this region (SIRPC, 2015).

This region has identified the need for more shovel-ready industrial sites to support economic growth and diversification. To support and attract growth, the region must develop the necessary infrastructure which will need to include residential housing, water storage and distribution, improvements and expansion of sewer systems, and improvement of transportation systems (SIRPC, 2015).

The EIRPC is a relatively new regional planning district that is in the process of developing a strategic plan to guide the organization with its economic development efforts.

2.10 Offsets to Threats

IDNR will apply the same restoration, enhancement and/or preservation approaches to help offset the predominant threats in the Whitewater East Fork White SA that were stated in the statewide portion of the CPF. The SA goals and objectives further define the general types and locations of the aquatic resources IDNR will provide as compensatory mitigation based upon identified threats, historic loss and current conditions. See **Appendix C** for a summary of offsets per major anthropogenic category and a general matrix of offset measures for each of the predominant threats to aquatic resources throughout the SA and the state.

ELEMENT 3. HISTORIC AQUATIC RESOURCE LOSS

The Whitewater-East Fork White SA historic aquatic resources were predominantly comprised of the deciduous hardwood forest that covered the majority of central and southern portions of the state. In addition, the SA contains the Whitewater River and its tributaries within its eastern portion and the southern portion contains the East Fork of the White River, its headwaters, and the Muscatatuck River and its tributaries near the southern boundary. The region's aquatic and natural communities were permanently altered by major land-use changes by early European settlement.

The influence early European settlers had on the state's landscape and aquatic resources was driven by the consumption of natural resources and converting land for agriculture. The Whitewater-East Fork White SA experienced these same pressures. In the 1800s, the region's forests were cleared for timber and the fertile soil they stood upon while poorly drained areas were eventually tiled in order to cultivate the land for agricultural production (Clifty Creek Watershed Project, 2008). During this time period, early settlement was located on lands along the Whitewater River because it furnished water power for the abundant linseed oil, flax, grist, and saw mills (Friends of the Middle Fork Watershed Steering Committee and Wayne County Soil and Water Conservation District, 2005). All of the major rivers and streams within the SA were affected by the same types of impacts.

The southern portion of the SA experienced similar impacts that resulted in aquatic resource loss. During the mid-1800s, as the state was settled by Europeans, land along the Muscatatuck River was cleared for farming. Between 1830s and 1870s, early settlers established subsistence farming that was

reliant upon corn, hogs and wildlife on land that is now the Muscatatuck National Wildlife Refuge; however, extensive deforestation from expanding farms and poor farming practices between 1880 and 1900 resulted in the ditching and channelization of Mutton and Storm Creeks in order to create additional farmland (U.S. Fish and Wildlife Service, 2009). Many of the aquatic resources were degraded and lost by similar practices throughout the SA.

Transportation played an important role in facilitating growth and development, resulting in aquatic resource loss, throughout the SA. Hagerstown provided the northern terminus of the Whitewater Canal which was constructed in 1836 providing transportation near the Ohio River for the regions commodities (West Fork Watershed Steering Committee and Wayne County Soil and Water Conservation District, 2011). In addition, the development of Michigan Road, a major north-south roadway, resulted in direct impacts to aquatic resources and natural communities within the SA. Michigan Road was commissioned in 1826, cutting through the regions dense forests, provided a connection from Madison, located on the Ohio River, extending through Indianapolis and ultimately ending at Michigan City on Lake Michigan (Historic Michigan Road Association, 2017).

The northern region of the SA was effected by the construction of a major east-west roadway, the National Road. In the 1830s, the National Road opened traffic from the eastern seaboard to the western interior, extending through Richmond before extending west towards Indianapolis (The Indiana National Road Association, 1997). Its construction and completion accelerated the influx of immigrants to the region, increasing growth of the Richmond area. Laborers were compensated for cutting trees, grading and hauling stone, sections of the road were planked with wood from the region, and used to construct the Whitewater River Bridge in 1834 (The Indiana National Road Association, 1997).

In addition, growth of the Richmond area was also influenced by the introduction of railroads within the region. During the mid-1800s, the Richmond and Miami Railroad incorporated and the region began to receive railroad service (City of Richmond Indiana , 2006). Each of these transportation routes provide early examples of the linear fragmentation and geomorphic alterations of the region's hydrologic processes which resulted in permanent aquatic resource degradation.

Due to extensive aquatic resource loss within the Whitewater-East Fork White SA, the understanding of the region's aquatic resources and the natural communities in which they existed is best reconstructed by evaluating the identified Natural Regions and Sections, and their related natural aquatic communities, associated within each respective Region and Section. **Figure 98** depicts each Natural Region and Section located within the Whitewater-East Fork White SA and identified within the Natural Regions of Indiana journal. In addition to the natural communities, the utilization of studies on Indiana's historic vegetative cover and mapped hydric and partially hydric soils provide further insight into the general location and makeup of the historic aquatic resources that existed before early

European settlement initiated their prolonged loss **(Table 84)**. The table details the SA's estimated land cover percentages for each region and section, identified natural communities, estimated hydric and partially hydric soils, and estimated forest cover.

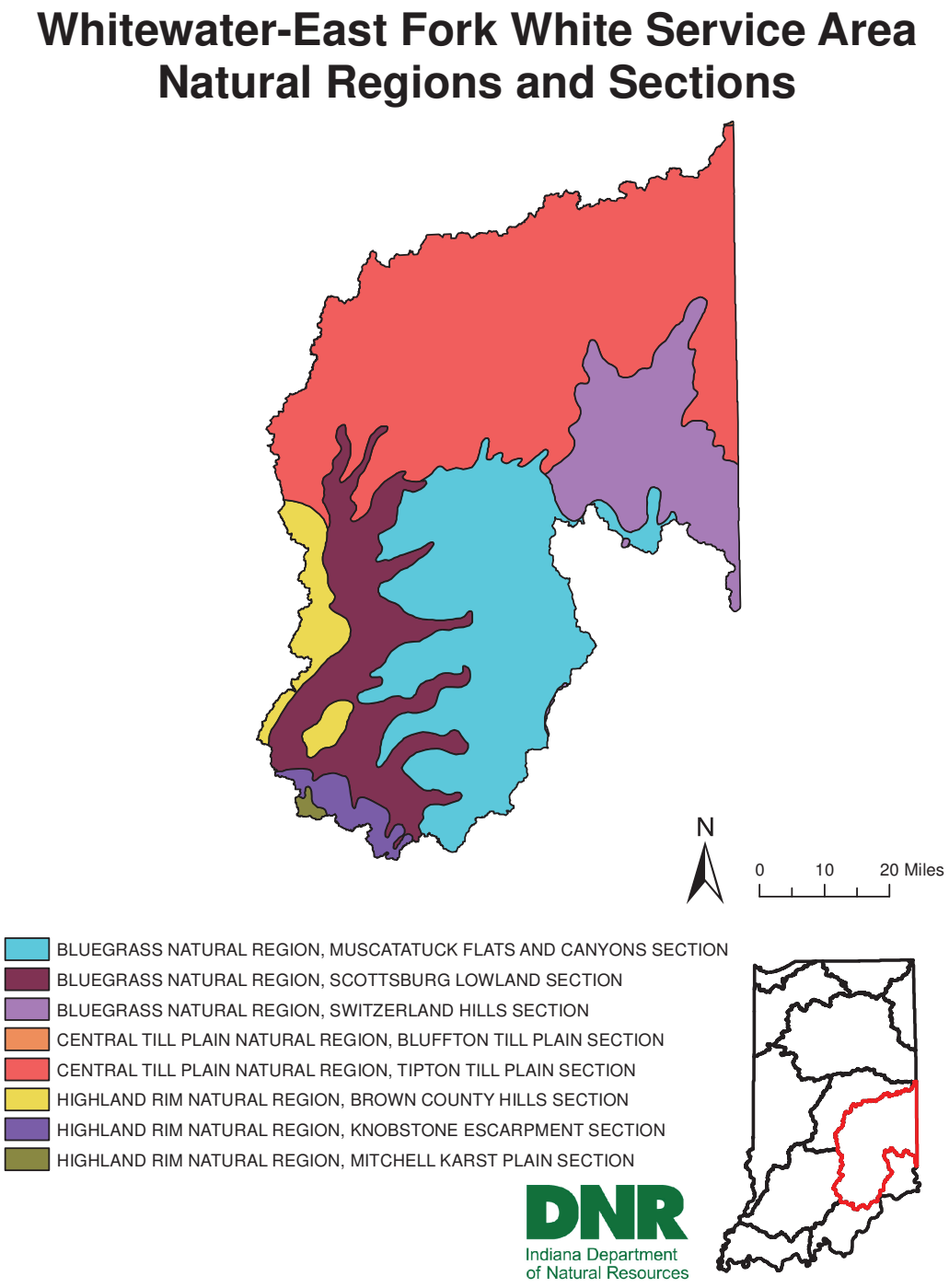

Figure 98. Natural regions and sections within the Whitewater-East Fork White service area (Homoya, Abrell, Aldrich, & Post, 1985)

Natural Region(s)	Natural Region: Section(s)			Hydric Soils		Partially Hydric		Pre-Settlement % Forest Cover
	Name	% Cover	Natural Region Community Types	Acres	% Cover	Acres	% Cover	% Forested
Highland Rim	Brown County Hills	3.69	Predominantly forested upland oak-hickory, mesic ravines;, acid seep spring (rare); medium to low-gradient streams	450,695	13.7	655,897	19.94	100.00
	Mitchell Karst Plain	0.24	Predominantly forested, barrens, cave, karst sinkhole pond and swamp (southern, sinkhole), flatwoods, barrens, limestone glade and several upland forest types; medium and high-gradient streams with rocky bottoms (few surface in karst)					
	Knobstone Escarpment	1.83	Predominantly various forest communities, glades (rare); small, and ephemeral high-gradient streams					
Central Till Plain	Bluffton Till Plain	0.01	Predominantly forested, minor areas of bog, prairie, fen, marsh and lake communities					
	Tipton Till Plain	43.75	Extensive beech-maple-oak forest, northern flatwoods; bog, prairie, marsh, seep spring, and pond					
Bluegrass	Switzerland Hills	12.05	Predominantly forested (mixed mesophytic), barrens (rare); rocky, gravel-bottomed, medium-gradient streams					
	Scottsburg Lowland	13.39	Predominantly floodplain forest and swamp; wetland, swamps, acid seep springs, pond; low-gradient, silty-bottomed streams and rivers					
	Muscatatuck Flats and Canyons	25.04	Predominantly mixed mesophytic forest, southern flatwoods, minor glade and karst; medium-gradient streams with beds of pavement-like limestone					

Table 84. The historic natural community composition for the Whitewater-East Fork White Service Area based upon the natural region and section

ELEMENT 4. CURRENT AQUATIC RESOURCE CONDITIONS

4.1. Streams and Rivers

GIS analysis of 303(d) category 4A and 5 impaired streams (IDEM-IR, 2016) indicates there are currently 2,053 miles of category 4A impaired streams and 2,912 miles of category 5 impaired streams documented in the SA. IDEM reported E. coli (3,159 miles), impaired biotic communities (618 miles), dissolved oxygen (587 miles), PCBs in fish tissue (259 miles), nutrients (135 miles), total mercury in fish tissue (129 miles), pH (64 miles), and ammonia (14 miles) as current stream impairments within the SA (IDEM-IR, 2016). There are stream reaches in which multiple impairments may occur; therefore there is some overlap with the impaired stream miles.

As of 2014, IDEM conducted 827 QHEI assessment reaches within the SA **(Table 85 and Figure 99)** (IDEM OWQ, 2014). Of the stream and river habitat reaches assessed, 47.64% are capable of supporting a balanced warm water community.

QHEI Score Ranges	Narrative Rating	Count	Percent of Total
<51	Poor Habitat	138	16.69
51-64	Habitat is partially supportive of a stream's aquatic life design	295	35.67
>64	Habitat is capable of supporting a balanced warm water community	394	47.64
	Total	827	100%

Table 85. IDEM Overall QHEI scores for Whitewater-EF White SA, 1991 – 2014 (IDEM OWQ, 2014)

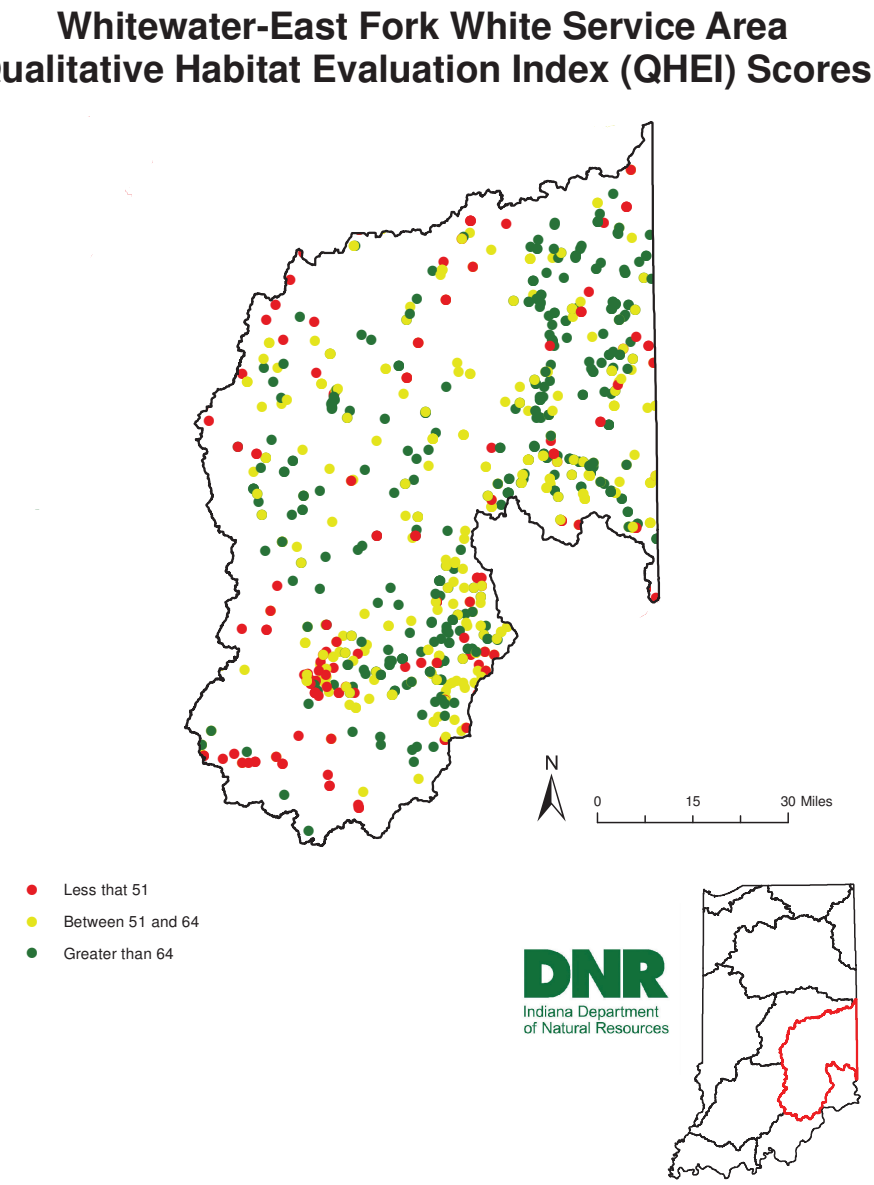

Figure 99. IDEM overall QHEI scores within the Whitewater-East Fork White service area; 1991-2014 (IDEM OWQ, 2014)

As discussed in the statewide portion of the CPF, the functions and services provided by forests are important to the ecological health of aquatic resources in all portions of the SA that were historically forested. Analysis of the 2011 NLCD indicates that the Whitewater-EF White SA ranks third overall in forested cover density of all SA's at 25% of total area with approximately 826,739 acres, and is the SA with the third highest percentage of forested cover with approximately 15.9% of 5,215,169 acres of forest cover statewide.

GIS analysis identifies approximately 11,818,126 linear feet (2,238 miles) of stream located within 100 feet of agricultural fields. Under these criteria, the Whitewater-EF White SA ranks fifth in ratio of these potentially restorable stream miles to square miles of SA at approximately 0.36 mile of potential restoration per one square mile, or one mile of potential restoration for every 2.77 square miles of SA.

4.2 Wetlands

Analysis of the NWI in the Whitewater-EF White SA identifies approximately 5,288 acres of freshwater emergent wetland (PEM) and approximately 88,586 acres of combined freshwater forested (PFO) and scrub-shrub (PSS) wetlands, accounting for approximately 2.85% of the total SA acreage. All of the aquatic resource types from the NWI combined account for approximately 4.19% of the total SA **(Table 86 and Figure 100).**

Aquatic Resource Type	Sum of NWI Aquatic Resource ACRES in SA	Percent of Total NWI Aquatic Resource Acres in SA	Percent of SA Total Acres	Percent of Total State Area –Acres
Freshwater Emergent Wetland	5,288	3.84%	0.16%	0.02%
Freshwater Forested/Shrub Wetland	88,586	64.28%	2.69%	0.38%
Freshwater Pond	17,109	12.42%	0.52%	0.07%
Lake	13,042	9.46%	0.39%	0.06%
Riverine	13,779	10.00%	0.42%	0.06%
Grand Total	**137,804**	**100.00%**	**4.19%**	**0.59%**

Table 86. Acres and percentage of acres of aquatic resource types from NWI analysis (USFWS NWI, 2015)

Hydric and partially hydric soils (NRCS-USDA, 2016) account for 840,113 acres (**Figure 101**), or 25.54% land cover within the SA with approximately 763,515 acres having the potential to be restored, accounting for 23.22% of the total SA. This was determined by mapping current hydric and partially hydric soils data with potentially restorable land cover types (e.g. cropland, pasture), excluding PFO, PSS and PEM wetlands from the NWI within agricultural land use. The Whitewater-EF White SA has the fifth highest percentage of recoverable wetland acres to total SA size of all SA's, and the 4th most potentially restorable wetland acres of any SA. This is due to the dominance of agricultural land uses and the SA size.

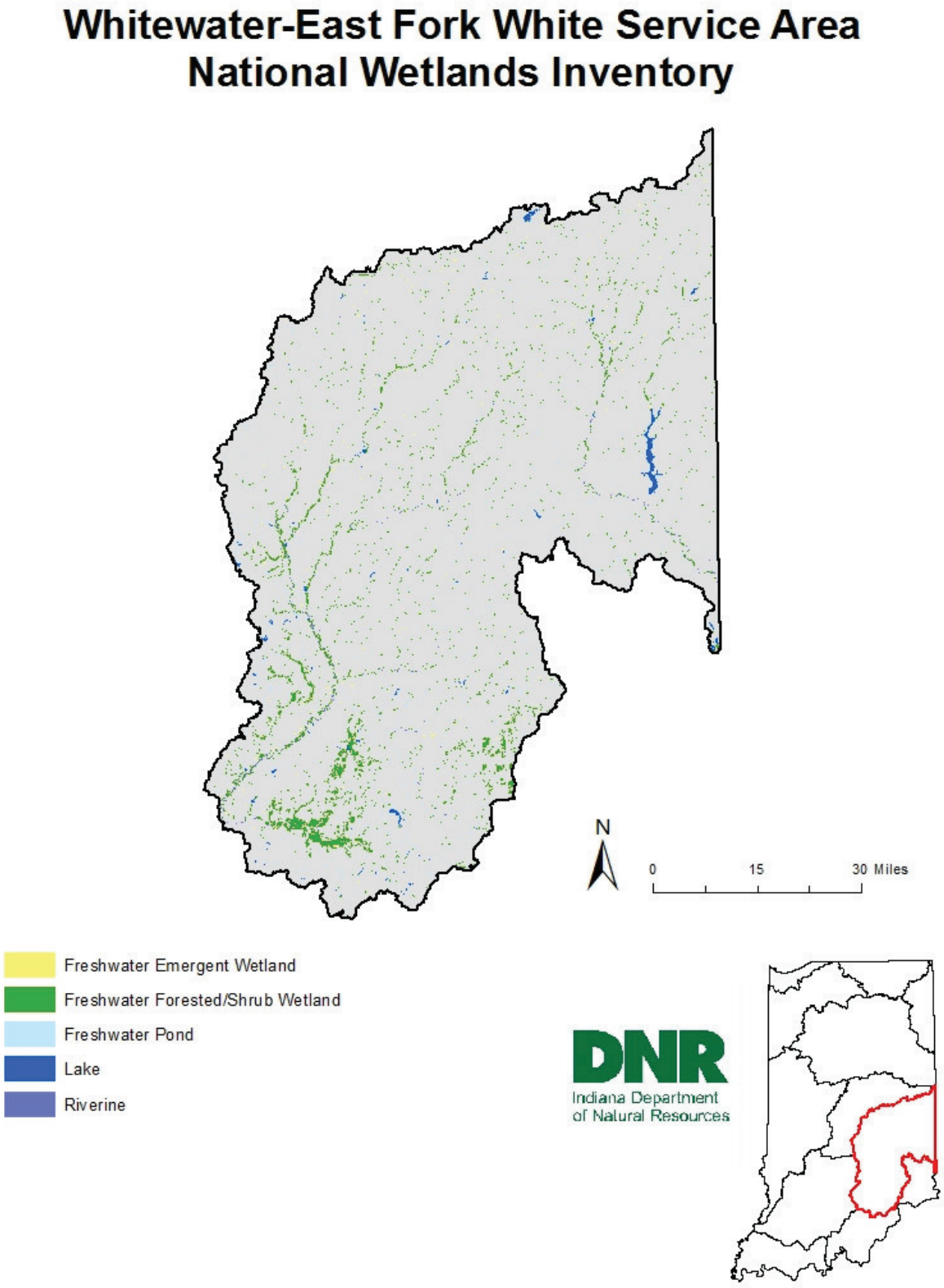

Figure 100. NWI for the Whitewater-East Fork White Service Area (USFWS NWI, 2015)

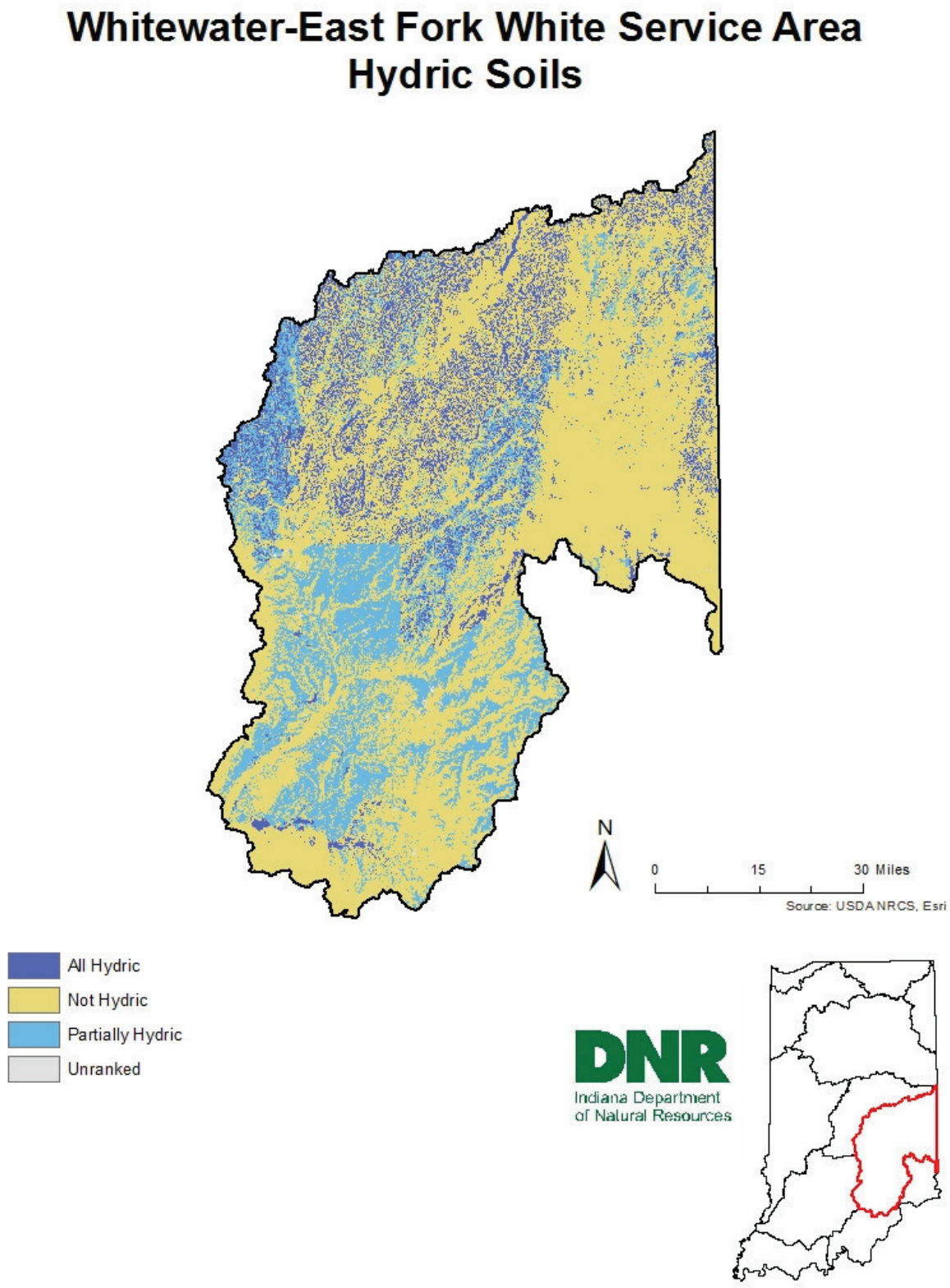

Figure 101. Hydric and partially hydric soils within the Whitewater-East Fork White service area (NRCS-USDA, 2016)

4.3 Concentrations of Potentially Restorable Wetlands and Streams

GIS hotspot analysis was conducted to document concentrations of the identified potentially restorable wetlands and streams. Hotspots account for 490,743 acres of potentially restorable wetlands within the SA. The watershed with the most hotspots of potentially restorable wetlands is Clifty Creek (HUC 0512020601 **[Table 87]**).

Hotspots account for 3,954,720 linear feet of potentially restorable streams within the SA. The watershed with the most hotspots of potentially restorable streams is Clifty Creek (HUC 0512020601 **[Table 88]**). The watersheds with the highest concentrations of potentially restorable wetlands and streams **(Tables 87 & 88)** serve as the basis of identification of areas that have experienced the most recoverable aquatic resource loss within the SA. **Figure 102** shows where these watersheds are located within the SA.

Approximately 3,714 acres of hotspots of potentially restorable wetlands are adjacent to IDNR-managed lands. Atterbury Fish and Wildlife Area is the IDNR-managed land in the Whitewater-East Fork White SA with the most adjacent hotspots of potentially restorable wetlands (1,235 acres). Approximately 11,423 linear feet of hotspots of potentially restorable streams are adjacent to IDNR-managed lands. Austin Bottoms Conservation Area is the IDNR-managed land with the most hotspots of potentially restorable streams (8,046 linear feet).

HUC 10 Code	HUC 10 Name	Hotspots of Potentially Restorable Wetlands (acres)
0512020601	Clifty Creek	55,624
0512020406	Youngs Creek	36,271
0512020603	Sand Creek	34,735
0512020506	Flatrock River	29,143
0512020407	Sugar Creek	25,519

Table 87. Watersheds in the Whitewater-East Fork White Service Area with the most hotspots of potentially restorable wetlands

HUC 10 Code	HUC 10 Name	Hotspots of Potentially Restorable Streams (linear feet)
0512020601	Clifty Creek	356,928
0512020501	Shankatank Creek-Flatrock River	239,184
0512020301	Martindale Creek-Whitewater River	216,480
0508000407	Sugar Creek	215,952
0512020504	Mill Creek-Flatrock River	214,368

Table 88. Watersheds in the Whitewater-East Fork White Service Area with the most hotspots of potentially restorable streams

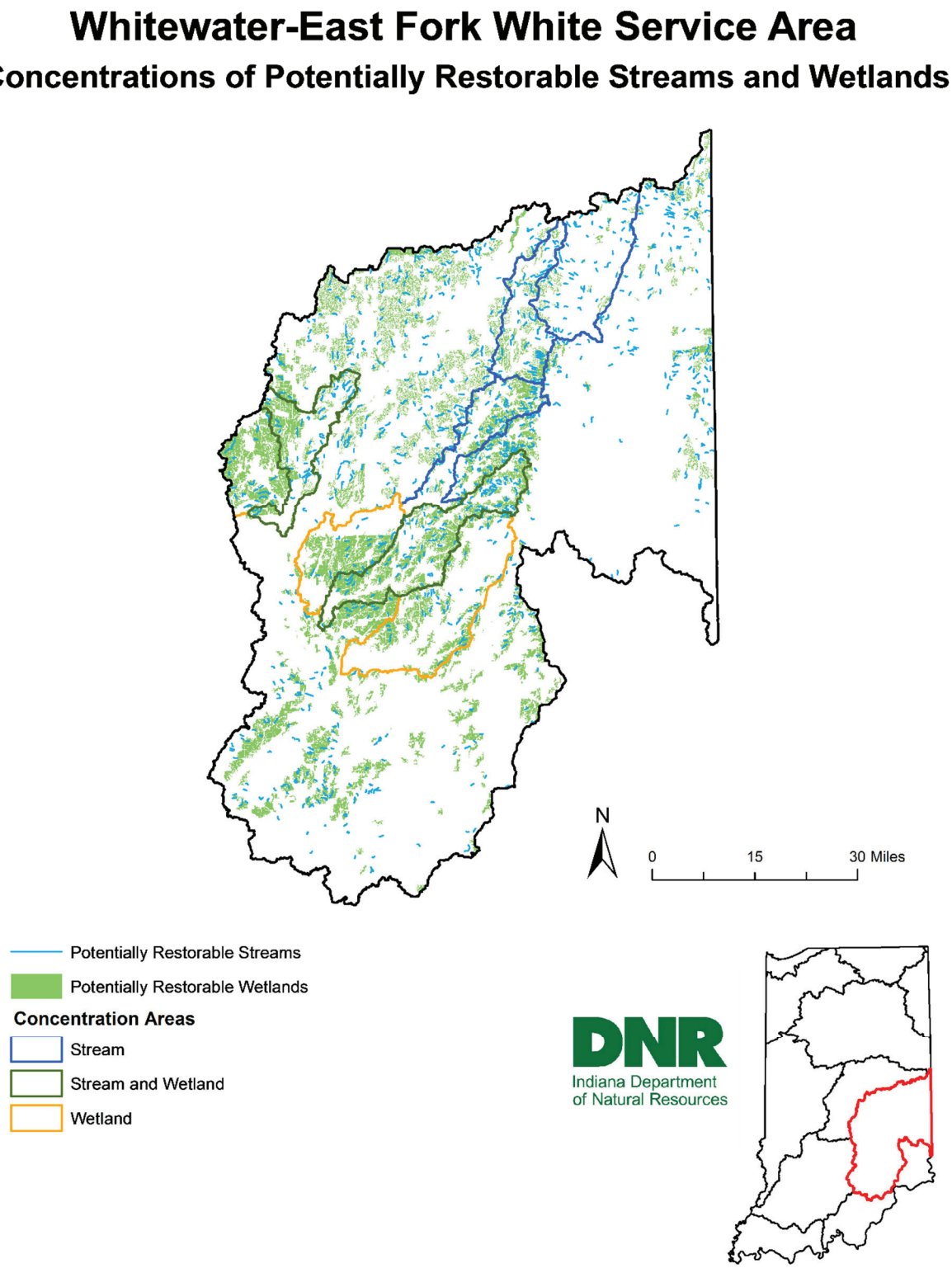

Figure 102. Concentrations of Potentially Restorable Streams and Wetlands in the Whitewater-East Fork White Service Area

4.4 Lakes, Reservoirs and Ponds

GIS analysis of 303(d) lake impairments (IDEM-IR, 2016) in the Whitewater-East Fork White SA indicates there are four lakes currently documented as having category 5 impairments, which measured using the National Hydrography Dataset (NHD) accounts for approximately 5,960 acres of PCBs in fish tissue and 194 acres with algae (IDEM-IR, 2016).

The 2011 NLCD identifies approximately 24,345 acres of open water which accounts for 0.74% of the SA. This varies from the NWI, which identifies approximately 17,109 acres of freshwater pond comprising of 0.5% of the SA, and 13,042 acres of lake comprising of 0.4% of total SA acres. There are no PFL's (IC 14-26-2-1.5) located within the Whitewater-East Fork SA. IDNR will remain up to date with reservoir (lake) condition data from sources such as IDEM, the Indiana Clean Lakes Program, watershed management plans, lake associations and the like as the landscape watershed approach is utilized to identify aquatic resource needs within the SA.

4.5 Ground Water and Surface Water Interaction

The data presented in this section will help identify potential areas in need of increased ground water recharge and/or identifying sensitive aquifers in need of increased buffering and protection from potential contamination threats.

Analysis of the near surface aquifer recharge rate data from IGS (Letsinger S. L., 2015) for the Whitewater-EF White SA identifies approximately 98% of the shallow unconsolidated aquifers receive between two to seven inches of ground water recharge annually **(Table 89).**

Recharge Rate	Inches/Year	Square Miles	Percent of Calumet-Dunes SA
High	14	0	0.00%
	13	0.01	0.0002%
	12	0.06	0.001%
	11	0.20	0.004%
	10	0.52	0.01%
	9	3.9	0.08%
	8	31	0.60%
	7	220	4.28%
	6	573	11.15%
	5	1,534	29.87%
	4	1,447	28.16%
	3	1,032	20.09%
Low	2	242	4.71%
	1	54	1.06%

Table 89. Approximate ground water recharge rates in the Whitewater-EF White SA (Letsinger S. L., 2015)

Analysis of the IGS near surface aquifer sensitivity mapping (Letsinger S. , 2015) indicates that nearly 100% of the Whitewater-EF White SA near surface aquifers are in the low to high range for sensitivity

to contamination with approximately 51% being moderate **(Table 90)**. The aquifer sensitivity reflects the middle to lower range of aquifer recharge rates.

Sensitivity	Square Miles	Percent of Total Acre
Very High	1	0.03%
High	732	14%
Moderate	2,633	51%
Low	1,753	34%
Very Low	17	0.33%

Table 90. Ground water sensitivity distribution in the Whitewater-EF White SA (Letsinger S. , 2015)

Analysis of the DNR Division of Water's Water Rights Section 2015 significant water withdrawal facilities data shows the Whitewater-EF White SA ranks last among SA's for registered capacity of surface water withdrawal with a 2015 withdrawal capacity of 8,424 MGD **(Figure 103)** (IDNR DOW, 2016). Industrial uses account for approximately 56% of registered withdrawal capacity, followed by public water supply at 40%, with the other categories accounting for the remaining 4%.

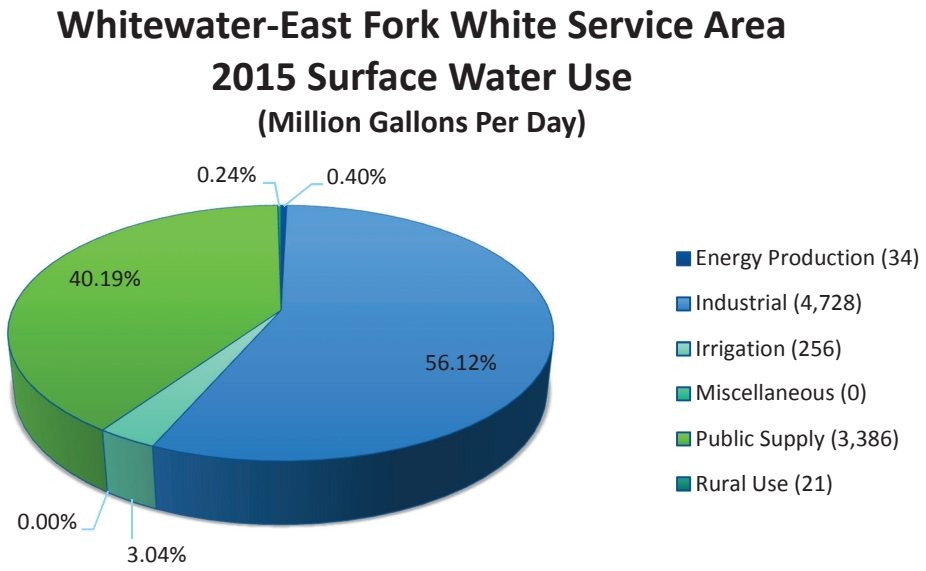

Figure 103. 2015 surface water usage in the Whitewater-East Fork White Service Area (IDNR DOW, 2016)

Significant ground water withdrawal in the Whitewater-EF White SA is sixth among the SA's with a 19,746 MGD registered capacity **(Figure 104).** Public water supply accounts for approximately 80% of registered ground water withdrawal capacity in the SA, followed by agricultural irrigation with 16%, and the other categories accounting for the remaining 4%.

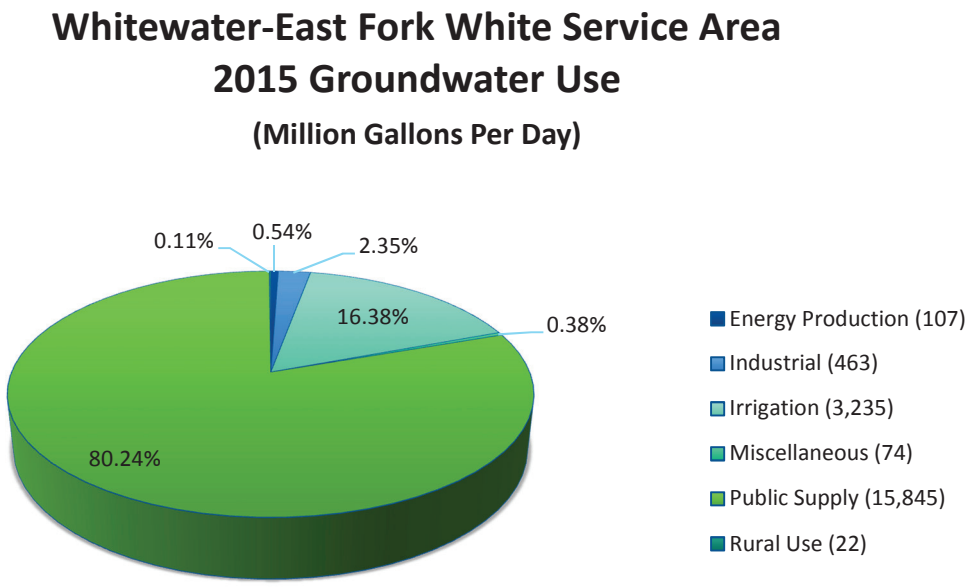

Figure 104. 2015 ground water usage in the Whitewater-East Fork White Service Area (IDNR DOW, 2016)

4.6 High Quality Aquatic Resources and Natural Communities

In addition to previous eco and natural region descriptions of this SA, other high quality natural communities currently documented in the Natural Heritage Database within the Whitewater-EF White SA include, but are not limited to acid seep, circumneutral seep, fen, and central till plain flatwoods, in addition to many other transitional, mixed and upland communities.

There are currently a minimum of seven amphibian species, 44 bird species, eight fish species, 17 mammal species, nine mollusk species, and 11 reptile species listed as SGCN within the SWAP Planning Regions within the Whitewater-EF White SA (SWAP, 2015).

ELEMENT 5. AQUATIC RESOURCE GOALS AND OBJECTIVES

Aquatic resource goals and objectives identified in the statewide CPF also apply to the Whitewater-EF White SA. The following aquatic resource goals and objectives apply specifically to the Whitewater-EF White SA based on 404 permitted impact trends, predominant threats, historic loss, current impaired and high quality aquatic resource conditions, habitats and SGCN, and current and future priority conservation areas.

1. Restoration, enhancement and preservation of aquatic resources that will help offset current and anticipated threats within the SA.
2. Re-establishment of historic aquatic resources that have experienced high concentrations of loss, fragmentation and/or impairment, such as the identified concentrations of potentially restorable streams and wetlands to include any channel restoration needs.

3. Implement projects within and adjacent to current and future areas identified as conservation priorities by federal, state and local government entities, and non-governmental organizations (stakeholder involvement/conservation partnerships) including the Healthy Rivers Initiative.
4. Preservation of rare and high quality aquatic resources; critical habitat for rare and endangered species; priority habitat for species of greatest conservation concern; and/or other areas meeting the requirements of 33 CFR §332.3(h).
5. Implement natural stream channel restorations in order to help offset chemical, physical and biological impairments and degradation resulting from anthropogenic activities to include considerations such as in-stream habitat, physical integrity, riparian cover, and/or potential removal or modification of dams.
6. Support critical habitat restoration for federal and state listed SGCN within and adjacent to aquatic resources while applying the SWAP identified conservation needs and actions in the Eastern Corn Belt Plains and Interior Plateau Planning Regions where feasible.
7. Stream and wetland restoration projects to buffer and protect karst features and systems unique to areas in southern Indiana.

ELEMENT 6. PRIORITIZATION STRATEGY

The four steps below present the prioritization criteria for mitigation site identification and selection. This prioritization strategy will be used for project selection within each service area. When prioritizing sites for mitigation projects, the following **core criteria** shall be utilized.

1. Mitigation site proposals must contain the ability to result in a successful and sustainable net gain and/or preservation of aquatic resource functions and services and/or result in no net loss of Indiana's aquatic resources.
2. Prioritization will be given to compensatory mitigation projects that provide the greatest benefit to the Whitewater-East Fork White SA, by providing the greatest lift in aquatic resource functions and services based upon the specific needs identified within the SA and/or watershed utilizing the watershed approach for site selection.
3. Project proposals will consider how to offset the anthropogenic threats to aquatic resources, historic loss, and existing and future impairments while achieving IN SWMP goals and objectives, within the SA.
4. Other prioritization evaluation criteria may include, but are not limited to; cost, feasibility, size, proximity to other conservation lands or protected areas, connectivity or location with respect to corridors, human use value, and efficient long term maintenance.

In addition to the Core Criteria, information from conservation partners, landowners and additional stakeholders may also be utilized during the site selection process as they may have additional data or a pre-existing list of priority restoration projects. Ground investigations will be required to confirm or dismiss these datasets and determine the best locations for compensatory mitigation project sites.

Currently, the following watershed plans exist within the SA: Brandywine Creek WMP, Central Muscatatuck WMP, Clifty Creek WMP, Conns Creek WMP, Flatrock-Haw WMP, Garrison Creek WMP,

Lick Creek WMP, Little Blue River WMP, Middle Fork-East Fork Whitewater WMP, Mud Creek WMP, Sand Creek WMP, Sugar Creek WMP, and Youngs Creek WMP. However, IDNR will utilize the most current watershed planning information that is available as these plans are updated and/or new watershed plans are developed within this SA over the life of the program.

ELEMENT 7. PRESERVATION OBJECTIVES

When applicable under 33 CFR §332.3(h) of the Federal Mitigation Rule, preservation objectives within the Whitewater-EF White SA will include rare and high quality natural aquatic and riparian communities, waters having a significant contribution to ecological sustainability, and critical habitat for SGCN while addressing the physical, chemical, or biological functions provided to the watershed that address critical conservation needs throughout the service area. Additionally, there will likely be aquatic resource and habitat preservation and/or enhancement opportunities in conjunction with the primary objective of restoration to be determined on a per project basis and approved by the Corps/IRT.

ELEMENT 8. PUBLIC AND PRIVATE STAKEHOLDER INVOLVEMENT

Currently, the following land trusts exist within the SA: Three Valley Conservation Trust, Whitewater Valley Land Trust, Inc., Oak Heritage Conservancy, Indiana Karst Conservancy, Red-tail Conservancy, Sycamore Land Trust, and Central Indiana Land Trust. There is the potential for land trusts to dissolve, adjust their geographical boundaries, and for new land trust organizations to be created within the SA. IDNR will work with the land trusts that exist in the SA over the life of the program

Additional stakeholders' interest and potential conservation partnerships specific to the Whitewater-EF White SA, and in which IDNR is an interested party include, but are not limited to the following organizations and/or initiatives:

- USGS Indiana Water Science Center
- USGS Kentucky Water Science Center
- USGS Illinois Water Science Center
- U.S. Fish & Wildlife Service Big Oaks National Wildlife Refuge
- U.S. Fish & Wildlife Service Muscatatuck National Wildlife Refuge
- U.S. Forest Service Hoosier National Forest
- Eastern Tallgrass Prairie and Big Rivers, and Appalachian Landscape Conservation Cooperatives
- Municipal Separate Storm Sewer Systems (MS4) Communities
- Municipal and County governmental entities
- Active Watershed Groups and appropriate Watershed Management Plans
- Southeastern Indiana Regional Planning Commission (SIRPC)
- Eastern Indiana Regional Planning Commission
- River Hills Economic Development District and Regional Planning Commission
- Madison County Council of Governments

- Indiana Karst Conservancy
- Oak Heritage Conservancy
- The Ohio-Kentucky-Indiana Regional Council of Governments (OKI)

Currently known public, private and non-profit conservation priority areas as identified by the 2015 IWPP (IWPP, 2015) are shown in **Figure 105** below.

ELEMENT 9. LONG TERM PROTECTION AND MANAGEMENT

Long term protection and management strategies will be conducted in the same manner per SA as outlined in the statewide CPF.

ELEMENT 10. PERIODIC EVALUATION AND REPORTING

Periodic evaluation and reporting on the progress of IN SWMP will be conducted in the same manner per SA as outlined in the statewide CPF.

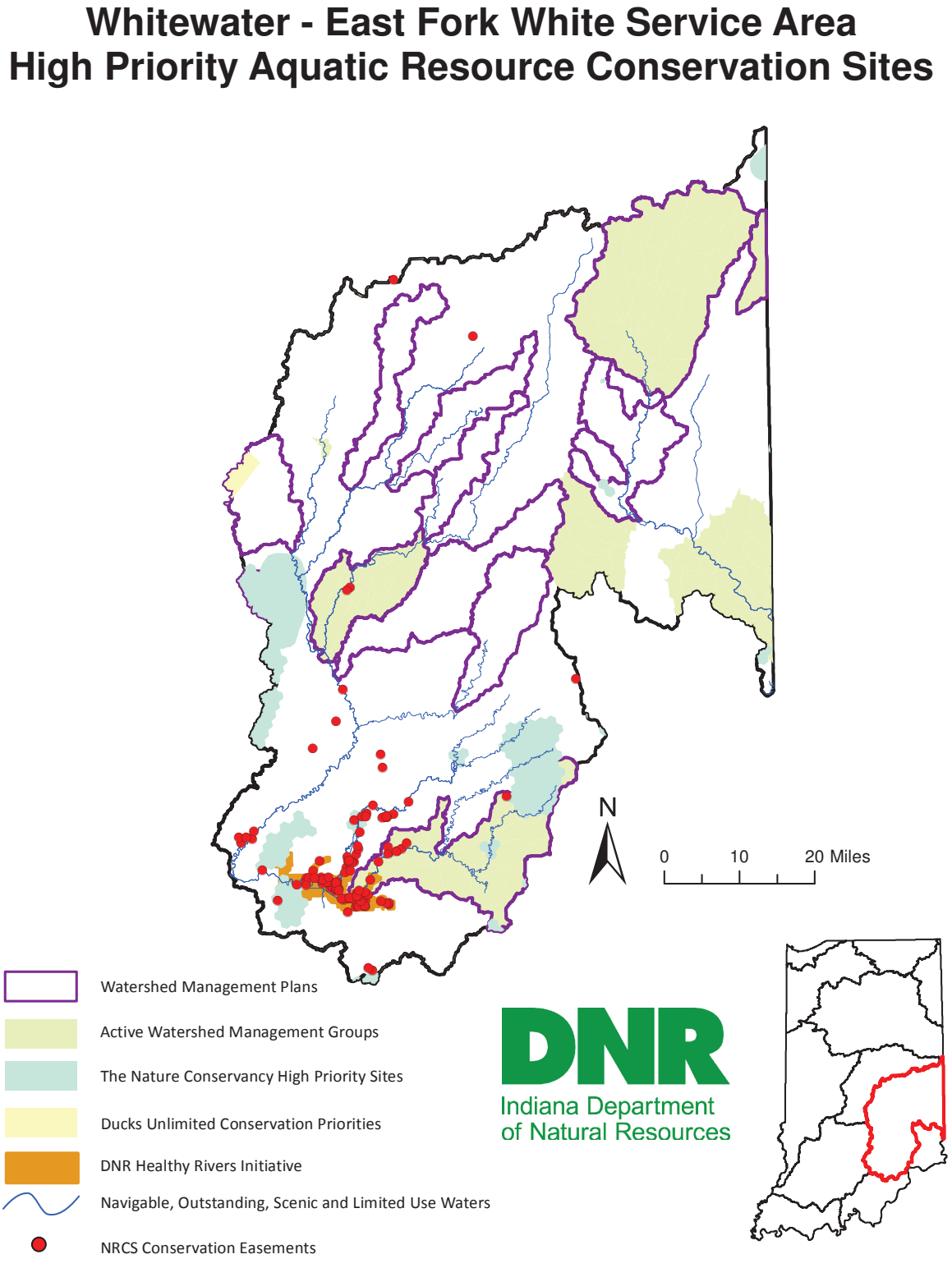

Figure 105. Priority aquatic resource conservation groups and sites within the Whitewater-East Fork White Service Area (IWPP, 2015)